

James F. Bowring

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Research Interests

My research interests include software architecture, software engineering, software testing, statistical behavioral analysis of software systems, and model-driven architecture. The theme of my research is the scientific exploration of software development processes with the twin goals of improving how we model problems and of improving how we implement computer-based solutions.

My current research focuses on developing and implementing formal methodologies for the large-scale management of data and analysis artifacts generated in the earth sciences.

Education

Ph.D. Computer Science, Georgia Institute of Technology, Atlanta, Georgia

Graduation: December 2006

Dissertation: "Modeling and Predicting Software Behaviors"

Advisors: Mary Jean Harrold and James M. Rehg

BS Summa cum Laude in Computer Science Information Systems, May 2000

College of Charleston, Charleston, South Carolina

BA Summa cum Laude in Historic Preservation & Community Planning, May 2000

College of Charleston, Charleston, South Carolina

Research Experience

College of Charleston, Department of Computer Science, Visiting Assistant Professor 2006-2008

2008: *Cyber Infrastructure Research and Development Lab for the Earth Sciences*: I founded and direct CIRDLES, funded as a sub-award to a NSF-funded project directed by J. Douglas Walker of the University of Kansas, entitled "Collaborative Project: Facility Support: EarthChem - Advancing Data Management in Solid Earth Geochemistry." The first project for CIRDLES is to create an exemplar end-to-end data processing system for uranium-lead geochronological data that will link data production to data archiving. This system will be the template for subsequent efforts to process all geochronological data such as other radioisotopic systems involving $^{40}\text{Ar}/^{39}\text{Ar}$, U-Th-He, and Lu-Hf. The lab also provides jobs and internships for undergraduates. Details at: <https://cirdles.cs.cofc.edu>

2007: *Automated Debugging*: I collaborated with James Jones and Mary Jean Harrold of Georgia Tech to develop machine-learning techniques to assist the automated debugging of programs. This work combines my behavior classification work with Jones' fault-localization work. We presented this work at ISSTA 2007 (see publications.)

Research Experience (cont.)

Georgia Institute of Technology, College of Computing, Ph.D. student 2001-2006

Aristotle Research Group Projects:

Software Tomography: I initiated and performed novel research to develop techniques to dynamically partition testing tasks across a large number of deployed copies of a program. I developed the software that demonstrated empirically the efficacy of the technique for the branch coverage-testing criterion. Software Tomography is now part of the GAMMA project at Georgia Tech.

Argo: I initiated and developed novel inter-disciplinary research between software engineering and intelligent systems that showed that certain event sequences in the execution of a program were stochastic processes that exhibit the Markov property. I developed the Argo system as a discovery tool and for performing empirical studies.

Gimbal Project: I initiated and developed the novel idea of a software Gimbal – a framework that supports software self-awareness by learning historical behavior models as a baseline for evaluating a current execution of a program. The Gimbal incorporates the Argo system for modeling as well as empirical studies.

Teaching Experience

College of Charleston, Department of Computer Science

Visiting Assistant Professor, 2006-2008

Fall 2008

CSCI-332 Database Concepts

CSCI-601 Data Modeling (graduate level)

Spring 2008

CSCI-110 Computer Fluency

CSCI-360 Software Architecture and Design

Fall 2007

CSCI-199 Visual and Computational Thinking (see Curriculum Development below)

CSCI-362 Software Engineering

CSCI-602 Foundations of Software Engineering (graduate)

Spring 2007

CSCI-110 Computer Fluency, 2 sections

CSCI-360 Software Architecture and Design

Fall 2006

CSCI-110 Computer Fluency, 2 sections

CSCI-362 Software Engineering

Curriculum Development

In 2007, I collaborated with Dr. Marian Mazzone, Chair of the Art History Department, to create a six-hour learning community course entitled “Visual and Computational Thinking.” The course guides students to analyze and present information visually using computers as the medium, emphasizing imagination, creativity, and problem solving. Syllabus at:

<http://www.cs.cofc.edu/~boring/classes/csci%20199/CSCI-199-002-2007-7.c.pdf>

Teaching Experience (cont.)

Georgia Institute of Technology, College of Computing

Research Coordinator, 2005-2006

I supervised two undergraduates as research assistants for three semesters. I also worked with a Master of Science student to extend my work to testing legacy systems, fall 2005.

Student Teacher, 2005

I assisted my advisor in teaching CS4001: Computing and Society, fall 2005.

Conference Hosting Experience

College of Charleston, Department of Computer Science

In 2007, I collaborated with Dr. Marian Mazzone, Chair of the Art History Department to create and host a conference in conjunction with the course we were teaching (see above Fall 2007.) The conference was called: Visual and Computational Teaching and Learning: a conference for college educators and was held November 16-17, 2007. Our motivation was that the liberal arts and sciences are embracing the computer revolution on a worldwide basis as educators create new courses to explore the interplay of computing and other disciplines. There is a common theme of visual and computational creativity at the core of these efforts. For both teachers and students the computer as a medium increasingly shapes how we think, work, and create. Digitized visual representations of information are becoming ubiquitous in our computerized culture, thus in the 21st century, students need to know how to analyze and manipulate representations of information on the computer effectively. Details and proceedings at: <http://www.cofc.edu/~thinking> .

Invention Disclosure

Automatic Classification of Software Behaviors. J. Bowring, J. Rehg, M. J. Harrold. Invention Disclosure 2999. Office of Technology Licensing, Georgia Institute of Technology, Oct 2003.

Publications (peer reviewed)

Building Cyber Infrastructure for Geochronology: A Case Study in Collaborative Software Engineering Research. J. Bowring. Proceedings of FSE Workshop on Infrastructure for Research in Collaborative Software Engineering (IRCoSE), November 2008, Atlanta, GA. (to appear.)

Building Cyberinfrastructure for Geochronology: Software Engineering Meets Geochemistry. J. Bowring, N. McLean, J. Walker, S. Bowring. Proceedings of the 2008 Geological Society of America Joint Annual Meeting, Houston, Texas, October 2008. (to appear.)

The EARTHTIME Initiative: A Review of Progress and Prospects. S. Bowring, J. Bowring, D. Condon, M. Heizler, K. Johnson, N. McLean, R. Parrish, J. Ramezani, B. Schoene. Proceedings of the 2008 Geological Society of America Joint Annual Meeting, Houston, Texas, October 2008. (to appear.)

Publications (peer reviewed, cont.)

More Than Just An Age: Quantitative Analysis of Geochronological Data and Uncertainty. N. McLean, J. Bowring, S. Bowring, R. Schoene. Proceedings of the 2008 Geological Society of America Joint Annual Meeting, Houston, Texas, October 2008. (to appear.)

A New Paradigm for Programming Competitions. J. Bowring. ACM SIGCSE Bulletin. February 2008, Portland, Oregon, vol. 40, pp. 87-91.

Debugging in Parallel. James A. Jones, James F. Bowring, and Mary Jean Harrold. International Symposium on Software Testing and Analysis, London, United Kingdom, July 2007, pp. 16-26.

Modeling and Predicting Software Behaviors. James F. Bowring. Dissertation. Georgia Institute of Technology. 2006.

Active Learning for Automatic Classification of Software Behavior. J. Bowring, J. Rehg, M. J. Harrold. *Proceedings of the International Symposium on Software Testing and Analysis (ISSTA 2004)*. July 2004.

TRIPWIRE: Mediating Software Self-Awareness. J. Bowring, J. Rehg, M. J. Harrold. *Proceedings of the 2nd ICSE Workshop on Remote Analysis and Measurement of Software Systems (RAMSS '04)*. May 2004.

Monitoring Deployed Software Using Software Tomography. J. Bowring, A. Orso, and M. J. Harrold. *Proc. of the ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE'02)*, November 2002, Charleston, SC, USA, pp. 2-9.

Technical Reports

Improving the Classification of Software Behaviors using Ensembles of Control-Flow and Data-Flow Classifiers. J. Bowring, M. J. Harrold, J. Rehg. Technical Report GIT-CERCS-05-10. College of Computing, Georgia Institute of Technology, April 2005.

Software Behavior: Automatic Classification and its Applications. J. Bowring, J. Rehg, M. J. Harrold. *Technical Report GIT-CERCS-03-19*. College of Computing, Georgia Institute of Technology, October 2003.

Proceedings Edited

Proceedings of Visual and Computational Teaching and Learning: a conference for college educators. J. Bowring and M. Mazzone, editors. Online at: <http://www.cofc.edu/~thinking/docs/T=vc^2.2007.Proceedings.pdf>. November 2007.

Presentations

A new paradigm for programming competitions. J. Bowring. Paper presented at the ACM Special Interest Group on Computer Science Education (SIGCSE) 2008 Conference, February 2008, Portland, Oregon.

Visual and Computational Thinking. J. Bowring. Panel on Computing in the Liberal Arts and Sciences, College of Charleston, April 27, 2007.

Active Learning for Automatic Classification of Software Behavior. J. Bowring. Paper presented at the International Symposium on Software Testing and Analysis, July 2004, Boston, Mass.

TRIPWIRE: Mediating Software Self-Awareness. J. Bowring. Paper presented at the 2nd ICSE Workshop on Remote Analysis and Measurement of Software Systems, May 2004, Edinburgh, Scotland.

Monitoring Deployed Software Using Software Tomography. J. Bowring. Paper presented at the ACM SIGPLAN-SIGSOFT PASTE'02 Workshop, November 2002, Charleston, SC.

Research Poster Presentations

Tripoli, U-Pb_Redux, Dzdatabase, and EarthChem: components of an integrated system for archiving, analyzing, and portraying U-Th-Pb geochronologic data. G. Gehrels, D. Walker, J. Bowring, S. Bowring, S. May. 5th Biennial Geochemical SIMS Workshop, June 2008, Madison.

Software Tomography - Enabling Continuous Improvement in Software Engineering. Jim Bowring. FSE - 10 Student Research Forum, November 2002, Charleston, SC, USA.

An Application of Recurrence Relations. Jim Bowring. Mathematical Association of America 77th Annual Meeting, March, 1998, Charleston, SC

Invited Workshop Participations

EARTHTIME Data Visualization Workshop. MIT, Cambridge, Mass. October 5-7, 2007.

EarthChem Workshop on Geochronology of Uranium-Lead. University of Kansas, Lawrence, KA, April 2007.

Fellowships and Honors

National Defense Science and Engineering Graduate Fellowship, 2001-2004
Georgia Institute of Technology President's Fellowship, 2001-2005
Phi Kappa Phi Graduate Fellowship, 2001-2002
Awarded ACM SIGSOFT CAPS scholarship to attend FSE 2002
Awarded ACM SIGSOFT CAPS scholarship to attend ICSE 2002
Awarded Outstanding Student Computer Science, 2000
Awarded Departmental Honors, Outstanding Student Historic Preservation, 2000
Lindstedt Scholarship in Historic Preservation 1999 - 2001
Golden Key National Scholarship 1999
Winning Teahouse design erected as sculpture on College of Charleston Campus 1999

Professional Affiliations

Association for Computing Machinery
IEEE Computer Society

Service Activities

Faculty participant in Learning Community initiative, College of Charleston 2007
Co-creator and organizer of Conference on Visual and Computational Thinking and Learning 2007
Faculty coordinator for Computing Outreach Lecture Series 2006-2008
Faculty coordinator for student trip to Department of Energy Day of Science, Knoxville, TN., 2007
Judge for Lowcountry Science Fair, Charleston, SC, 2007 – 2008.
Faculty advisor to ACM student chapter, College of Charleston, 2006-2008
External reviewer for International Conference on Software Engineering 2006
Participated in writing successful NSF grant application for Highly Dependable Computing and Communication Systems Research (HDCCSR)
College of Computing, Graduate Student Tea Organizer, Spring and Fall 2004
Volunteer, Atlanta Mayor's Office of Community Technology 2003-2004
Town of Mount Pleasant, SC, Commercial Development Design Review Board, 2000-2001
President ACM student chapter, College of Charleston, 1999-2000
Board Member, Moultrie Middle School PTA, Mount Pleasant, SC, 1995-1996
Membership Chair, Charleston, SC Chapter, Construction Specifications Institute 1991-1992

Professional Experience – Computing

MedicAllInOne, LLC, James Island, South Carolina, Owner, 2000 – present, Software architect
Software: *TheVaccinator* – Immunization Management System, MedicAllInOne.com

Sunchex Systems, LLC, Mount Pleasant, South Carolina, Owner, 1980 – present, Software architect
Software: *U-Pb_Redux*–Determination of Radioactive Isotope Ages: www.earth-time.org
Tripoli – Mass Spectrometry Statistics: eaps.mit.edu/research/group/IGLab/tripoli/
Tangiers – Fisons Plasmaquad Data Reduction: TheBowringCompany.com/Tangiers/
AccountMaster – Job and General Accounting System for Contractors – by request

CAMmatic, Inc., Mount Pleasant, South Carolina, 1999 - present
Consultant Software Engineer for *RPWorks* - Rapid Prototyping solutions, Cammatic.com/

Charleston Air Force Base, Phoenix Star Quality Management, 1998 – 2000, Software architect
Software: *PhoenixStar2000* – Quality control management software, proprietary

Compusult, Inc., Charleston, South Carolina, 1995 – 2002, Software architect
Software: *CCM* – Contact and contract management system, proprietary

Bolt, Beranek, and Newman, Cambridge, Massachusetts, 1969 – 1970
Lisp Programmer in Artificial Intelligence lab, directed by Dr. Daniel Bobrow

Project MAC, Massachusetts Institute of Technology, Cambridge, Mass., 1967
Lisp Programmer in Artificial Intelligence lab, directed by Dr. Seymour Papert

Entelek, Inc., Gloucester, Massachusetts, 1966 – 1968
Student Software Consultant for Educational Products Division (volunteer)

Berkeley Enterprises, Inc., Publishers of “Computers and Automation,” Newton, Mass., 1966-1968
Student Consultant to owner Edmund C. Berkeley (volunteer)

Professional Experience – General Contractor

The Bowring Company LLC, Mt. Pleasant, South Carolina, Owner, 1996 - 2004
Construction Management, Inspections, Estimating, Forensic Investigations

Palmetto Craftsmen, Inc., Charleston, South Carolina, Owner (1/2), 1991 - 1996
Licensed General Contractor

Landmark Land Company of Carolina, Inc., Kiawah Island, SC, 1989 - 1991
Vice President for Construction, Licensed General Contractor

The Beach Company / Associated Contractors of Charleston, Charleston, SC, 1988 - 1989
Executive Vice President, Licensed General Contractor

James & Sun Construction, Inc., Mt. Pleasant, South Carolina, Owner, 1980 - 1988
Design/Build General Contractor specializing in custom homes, solar applications

Engineering, Surveying, and Planning, Inc., Charleston, South Carolina, 1979 – 1980
Survey Party Chief

Wilkinson Surveying and Engineering, Inc., Dunbar, West Virginia, 1978 – 1979
Survey Party Chief

James F. Bowring – Sole Proprietor, Philadelphia, Pennsylvania, 1973 - 1978
Contractor specializing in historic renovations and remodeling

Professional Licenses

Residential Home Inspector, South Carolina, 1996 – 2004

General Contractor Unlimited Residential, South Carolina, 1980 – 2004

General Contractor Unlimited Buildings, South Carolina, 1988 – 2000